

Working Draft

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Section 1

Introduction

This document serves as Revision 1 to the sampling and analysis plan (SAP) for the contaminant screening study (CSS) as part of the remedial investigation (RI) activities for the Libby Asbestos Site Operable Unit (OU) 4 under the Response Action Contract (RAC). This SAP outlines the support that CDM Federal Programs Corporation (CDM) provided to the U.S. Environmental Protection Agency (EPA) under Work Assignment 116-RIRI-08BC during 2002 activities and will continue to provide under Work Assignment 137-RIRI-08BC during 2003 activities.

This section provides a general explanation of the purpose of the CSS and background information related to the initiation of the CSS and project organization. An expanded site background is provided in Section 2.

Previous sampling investigations at the Libby Asbestos Site include the Phase I and Phase II sampling efforts. The Phase I sampling program, initiated in early 2002, was designed as a rapid pilot-scale investigation to obtain information on airborne asbestos levels in Libby in order to judge whether a time-critical intervention was needed to protect public health, obtain data on asbestos levels in potential source materials, and identify the most appropriate analytical methods to screen and quantify asbestos in source materials. Phase I sampling activities are ongoing, and the Phase I quality assurance project plan (QAPP) (EPA 2000a) will be the guidance documents for the collection of samples not specific to the CSS. Results of initial Phase I sampling prompted removal actions at various sites in and around Libby; the screening and export plants, the Flyway, KDC Bluffs, Plummer Elementary, Libby High School, Libby Middle School, and several residential and commercial properties. Removal actions were completed in 2002 at the screening and export plants, as well as various residential and commercial properties. These removal actions are designed to remove major sources of Libby amphibole (LA) in and around the City of Libby. Restoration activities will continue at the former screening plant site in 2003.

The Phase II sampling investigation began in March 2001 and was designed to collect systematic data on asbestos levels in air and other media in Libby to allow a reliable evaluation of current human exposure and health risk from asbestos, as well as an identification of sources of unacceptable levels of asbestos in air. A summary of the findings (EPA 2001a) of the Phase I and II studies is presented below:

- Asbestos occurs in ore and processed vermiculite obtained from the mine site located outside the city of Libby.
- Asbestos fibers of the type that occur in vermiculite ore from the mine site are hazardous to humans when inhaled.
- Asbestos material fibers that are characteristic of those that occur in materials from the Libby mine are present in a variety of different source materials at residential and commercial locations in and around the community of Libby. Outdoor source

materials include yard soil, garden soil, driveway material, and assorted mine waste materials while indoor source materials include dust and Libby vermiculite attic insulations.

- Disturbance of asbestos-contaminated source materials can result in exposure to respirable asbestos fibers in air.
- The concentrations of fibers in air generated by disturbance of source materials may exceed the Occupational Safety and Health Administrations (OSHA) standards for acceptable occupational exposures, and estimated excess cancer risks can exceed EPA's typical risk range by an order of magnitude or more.

The results of the Phase I and II investigations show that LA source materials, when disturbed, release significant amounts of respirable LA (EPA 2001a). LA sources may include primary sources such as vermiculite containing insulation (VCI), vermiculite products and waste, soils contaminated with greater than 1 percent LA, or secondary sources such as soil or dust that are contaminated with LA.

LA-containing vermiculite products have been used randomly at unknown properties in the past, and, as a result, EPA has determined that each property in the Libby Valley requires screening for potential sources of LA. However, as a result of the size of the site and the number of properties that need to be evaluated, emphasis needed to be placed on an approach that minimized sampling and analysis to identify areas requiring remediation. In addition, quantitative rules for identifying all sources of potential concern are not yet developed and depend on further development of analytical methods and site-specific risk assessment. Therefore, the CSS was designed to use a combination of visual inspections, verbal interviews, and outdoor soil sampling to screen for the presence or absence of potential sources of LA in areas where exposure is most likely to occur.

CSS activities were initiated in May 2002; the interim results of the CSS are presented in the CSS interim results report (CDM 2003a). CSS activities will continue into 2003 following the procedures detailed in this SAP. This SAP is the first revision of the CSS SAP (CDM 2002b). This revision implements all modifications made to the CSS SAP during the 2002 CSS activities and provides current information on soil sample analysis methods and data validation criteria established for soil samples analyzed for asbestos. The procedures detailed in this SAP revision will be conducted concurrently with the RI activities detailed in the RI SAP (CDM 2003b) and illustrated in Figure 3-2.

This SAP is comprised of a field sampling plan (FSP) and a QAPP specific to the CSS. The purpose of this FSP is to provide guidance to ensure that all environmentally related data collection procedures and measurements are scientifically sound and of known, acceptable, and documented quality and that they are conducted in accordance with the requirements of the project. The following sections and appendices are included in this SAP:

Section 1	Introduction
Section 2	Site Background
Section 3	Data Quality Objectives (DQOs)
Section 4	Sampling Program, Rationale, and Locations
Section 5	Field Activity Methods and Procedures
Section 6	Laboratory Analysis and Procedures
Section 7	Quality Assurance (QA)/Quality Control (QC) Program
Section 8	References
Appendix A	Syracuse Research Corporation (SRC) Technical Memorandums
Appendix B	Site Health and Safety Plan (HASP)
Appendix C	CDM Technical Standard Operating Procedures (SOPs) and Site-Specific Guidance Documents
Appendix D	Record of Deviation/Request for Modification Form
Appendix E	Volpe Paperwork Flow Process
Appendix F	Laboratory Training Outline
Appendix G	American Society for Testing and Materials (ASTM) Method D5755-95

1.1 Objectives

The primary objective of this investigation is to determine the presence or absence of potential LA sources at each property within the study area. There are several secondary objectives including:

- Identification of properties that will likely require remediation (i.e., contain primary sources)
- Identification of properties that will require further investigation (i.e., contain or have indicators of secondary sources)
- Quantification of relative LA abundance in soils
- Identification of characteristics of properties that may increase chance of exposure to LA
- Identification of characteristics of properties that may aid in development of remedial decisions
- Determination of spatial trends

The CSS results will support future risk-based investigation and cleanup decisions on a property-by-property basis. The CSS activities will be conducted concurrently with RI activities as described in the RI SAP (CDM 2003b).

1.2 Project Schedule and Deliverables

Fieldwork to continue the CSS is expected to begin on or about May 19, 2003 and continue until October 2003. See the project work plan (CDM 2003c) for the schedule of additional deliverables. Resulting project deliverables will include a section regarding adherence to this SAP, any deviations that occurred, and any resulting corrective action taken.

1.3 Project Organization

EPA, the John A. Volpe National Transportation Systems Center (Volpe), and CDM organization and responsibilities specific to this investigation are discussed in this section. The project organization chart is presented in Figure 1-1.

1.3.1 EPA Project Management

The EPA remedial project manager (RPM), Mr. Jim Christiansen, is CDM's primary contact for coordinating work at the Libby Asbestos Site. Mr. Christiansen is responsible for:

- Defining the scope of the CSS
- Defining data quality objectives
- Selecting CSS team and contractors
- Reviewing all project deliverables
- Maintaining communications with the CDM project manager for updates on the status of the CSS activities
- Reviewing monthly status reports
- Providing oversight of the CSS
- Ensuring that plans are implemented according to schedule
- Reviewing work progress for each task to ensure that budgets and schedules are met
- Reviewing and analyzing overall performance with respect to goals and objectives
- Reviewing analytical results
- Using data collected during the CSS for remediation decision-making

The EPA community involvement coordinator (CIC) for the Libby Asbestos Site is Wendy Thomi. Ms. Thomi, as the CIC, is responsible for :

- Organizing community advisory group (CAG) meetings
- Developing publications in the local newspaper
- Organizing public meetings
- Developing frequently asked questions (FAQ) sheets for public distribution

1.3.2 Volpe Management

The Volpe management team will be comprised of the following positions: project manager, onsite representative, and the database manager.

The Volpe project manager for the Libby Asbestos Site is John McGuiggin. Mr. McGuiggin, as the Volpe project manager, is responsible for the management and coordination of the following activities:

- Overall management of the Libby Asbestos Project
- Maintaining communication with EPA and CDM project managers
- Coordinating with CDM to ensure EPA needs are being met
- Tracking of overall budget

The onsite representative for the Volpe is Courtney Zamora. Ms. Zamora, as the onsite Volpe representative, is responsible for the following:

- Daily communication with EPA and Volpe project manager
- Oversight of all site activities
- Coordination with CDM to ensure EPA needs are being met

The database manager for Volpe is Mark Raney. Mr. Raney, as the database manager, is responsible for the following:

- Management of the Libby project database
- Communication with CDM sample coordinator regarding errors on field forms
- Communication with CDM laboratory coordinator regarding laboratory deliverables

1.3.3 CDM Project Management

The CDM management team will be comprised of the following positions: project manager, RAC project manager, onsite manager, health and safety coordinator, field health and safety coordinator, sample coordinator, laboratory coordinator, CSS task

leader, project QA Manager (QAM)/QA Coordinator (QAC), and sampling team leaders.

The CDM project manager for overall work at the Libby Asbestos Site is Tim Wall. Mr. Wall, as project manager, is responsible for the overall management and coordination of the following activities:

- Maintaining communication with the Volpe regarding the overall status of the Libby Asbestos Project
- Preparing status reports for the Volpe
- Supervising production and review of deliverables for the Volpe
- Tracking overall budgets and schedules
- If applicable, notifying the responsible QA staff immediately of significant problems affecting the quality of data or the ability to meet project objectives
- Procuring laboratory subcontracts

The CDM RAC project manager is Jeff Montera. Mr. Montera, as the RAC project manager, is responsible for the management and coordination of the following activities as associated with the RI project:

- Maintaining communication with EPA Region VIII regarding the status of the CSS
- Preparing status reports for EPA Region VIII
- Supervising production and review of deliverables for EPA Region VIII
- If applicable, notifying the responsible QA staff immediately of significant problems affecting the quality of data or the ability to meet project objectives
- Incorporating and informing EPA and the Volpe of changes in the work plan, SAP, HASP, QAPP, and/or other project documents associated with the CSS

The CDM onsite manger is David Schroeder. Mr. Schroeder, as the onsite manager, is responsible for the management and coordination of the following activities:

- Maintaining communication with Mr. Wall, Mr. Montera, and the onsite representative from the Volpe concerning the daily activities of the CSS
- Coordinating daily work activities
- Scheduling personnel and material resources needed to complete the CSS

- If necessary, identifying problems and resolving difficulties in consultation with EPA, Volpe, and CDM staff
- Ensuring field aspects of the investigation, including this QAPP, SAP, and other project documents, are implemented by the CSS task leader
- Organizing and conducting daily meetings with onsite personnel
- Implementing and documenting corrective action procedures at the team level
- Providing communication between the sampling team and project management
- Preparing daily reports regarding field activities for the onsite Volpe representative

The CDM health and safety coordinator for the Libby Asbestos Site is responsible for the following:

- Ensuring all work will be conducted in accordance with the site-specific HASP that governs the fieldwork outlined in this SAP
- Updating the HASP and ensuring the field health and safety officer is informed of the changes

The CDM field health and safety officer for the Libby Asbestos Site is responsible for the following:

- Ensuring that the protocols specified in the HASP are carried out during field activities
- Ensuring that copies of the HASP and CDM health and safety manual are maintained at the site at all times
- Based on existing site conditions, upgrading or downgrading levels of protection in accordance with the HASP
- Conducting an initial health and safety meeting for all personnel
- Providing an overview of the HASP to all assigned field personnel and having them sign a form to indicate they understand the content of the HASP document and will adhere to its specifications
- Contacting the health and safety coordinator if any questions or issues arise during field activities

The CDM sample coordinator for the Libby Asbestos Site is responsible for the following:

- Maintaining all field paper work

- Informing the laboratory and the laboratory coordinator of the number of samples shipped to the laboratory
- Shipping samples to the laboratory
- Ensuring all samples are maintained within proper chain-of-custody (COC) requirements
- Coordinating data entry requirements related to field forms
- Providing data results to EPA via data requests
- Ensuring all paperwork is received by the appropriate CDM office for document control files, as described in Section 5

The CDM laboratory coordinator for the Libby Asbestos Site is responsible for the following:

- Ensuring sample load can be met by subcontracted laboratories
- Tracking samples through the analysis process to ensure all results are returned within the appropriate turnaround time
- Ensuring all original data packages are sent to the CDM Helena, Montana office for filing and a copy of each data package related to the CSS is sent to the CDM office in Denver, Colorado

The CDM QAM/QAC for the Libby Asbestos Site is responsible for the following:

- Monitoring all quality assurance/quality control (QA/QC) activities of the project (as described in Section 7)
- Identifying QA areas that need changes or improvements
- Verifying that corrective actions resulting from staff observations, QA/QC surveillances, and/or QA audits are documented and implemented
- Communicating directly with the CDM project manager and site manager regarding daily QA/QC issues

The CDM CSS field team leader for the Libby Asbestos Site is responsible for the following:

- Ensuring that all sample team members are trained in proper sample collection and field documentation as described in this SAP
- Coordinating with the community relations personnel to ensure that access agreements are completed prior to sampling of a property

- Maintaining proper supplies necessary for each sampling team
- Performing QC checks of field team documentation and a 2 percent check of field observations and completing required documentation of the QC checks
- Coordinating with the onsite manager regarding the daily activities of the CSS
- Implementing field aspects of the investigation, including this QAPP, SAP, and other project documents
- Conducting orientation training for all field team members

The CDM team leader for each sampling group is responsible for the following:

- Ensuring that sampling is conducted in accordance with pertinent CDM SOPs and that the quantity and location of the samples meet the requirements of this SAP
- Maintaining proper chain-of-custody forms and sample labels for proper transfer of the samples to the sample coordinator
- Properly completing all field paperwork as specified in CDM site-specific SOPs

1.3.4 CDM Quality Assurance Organization

CDM's QA manager, Mr. George DeLullo, implements the QA program. The QA manager is independent of the technical staff and reports directly to the president of CDM on QA matters. The QA manager, thus, has the authority to objectively review projects and identify problems and the authority to use corporate resources as necessary to resolve any quality-related problems.

The QAC for this project, Ms. Krista Lippoldt, reports to the QA manager on QA matters. Under the oversight of the QA manager, she is responsible for the following:

- Reviewing and approving the project-specific plans
- Directing the overall project QA program
- Reviewing QA sections in project reports, as applicable
- Reviewing QA/QC procedures applicable to this project
- Auditing selected activities of this project performed by CDM and subcontractors, as necessary
- Initiating, reviewing, and following up on response actions, as necessary
- Maintaining awareness of active projects and their QA/QC needs

- Consulting with the CDM QA manager, as needed, on appropriate QA/QC measures and corrective actions
- Conducting internal system audits to check on the use of appropriate QA/QC measures, if applicable
- Arranging performance audits of measurement activities, as necessary
- Providing monthly written reports on QA/QC activity to the CDM QA manger

In addition to the CSS team (i.e., EPA, Volpe, and CDM), the following organizations have provided input in the form of discussions and written comments on the development of the CSS SAP:

- U.S. Geological Survey (USGS)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- U.S. Public Health Service
- Montana Department of Environmental Quality (MDEQ)

In addition, several community involvement measures have been or will be taken to provide information to the Libby community regarding the RI. The measures will include:

- CAG meetings
- Publications in the local newspaper
- Public meetings
- A publicly distributed FAQ sheet describing the sampling event

Figure 1-1

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Section 2

Site Background

2.1 Site Location

The Libby Asbestos Site is located within Sections 3 and 10, T30N, R31W of the Libby Quadrangle in Lincoln County, Montana (Figure 2-1). It includes a vermiculite mine; two former vermiculite processing centers, the former screening plant and the former export plant; the road between the former screening plant and the mine site (Rainy Creek Road); and homes and other businesses, which may have become contaminated with asbestos fibers as a result of the vermiculite mining and processing conducted in and around the City of Libby (Figure 2-2).

2.2 Site History

Vermiculite was discovered 7 miles northeast of Libby, Montana in 1881 by gold miners. In the early 1920s, Mr. Edward Alley began initial mining operations on the vermiculite ore body located approximately 7 miles northeast of Libby. Full-scale operations began later that decade under the name of the Universal Zonolite Insulation Company (Zonolite). This ore body contained amphibole asbestos fibers with compositions including tremolite, actinolite, richterite, and winchite (herein referred to as LA) as defined by B.E. Leake, et al. (1997). Unlike the commercially exploited chrysotile asbestos, LA material has never been used commercially on a wide scale, and, for the mine's operating life, it was considered a byproduct of little or no value. The commercially exploited vermiculite was used in a variety of products, including insulation and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

The vermiculite ore was mined using standard strip mining techniques and conventional mining equipment. The ore was then processed in an onsite dry mill to remove waste rock and overburden material. Once processed, the ore was transported from the mine to the former screening plant, which sorted the ore into five size ranges. After the sorting process, the material was shipped to various locations across the United States, for either direct inclusion in products or for "expansion" prior to use in products. Expansion (also known as "exfoliation" or "popping") was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 degrees Fahrenheit (°F). This process explosively vaporizes the water contained within the phyllosilicate structure causing the vermiculite to expand by a factor of 10 to 15. This produces the vermiculite material most commonly sold as soil conditioner for gardens and greenhouses.

In Libby, operations handling this material occurred at four main locations: the mine and mill located on Rainy Creek Road on top of Zonolite Mountain; the former screening plant and railroad loading station located at the intersection of Highway 37 and Rainy Creek Road and directly across the Kootenai River, respectively; the former expansion/export plant (the former export plant) located immediately west of Highway 37 where it crosses the Kootenai River; and at the former expansion plant located at the end of Lincoln Road, near 5th Street (Figure 2-3). The Lincoln Road

Expansion Plant went off line sometime in the early 1950s. Investigations are underway to determine the exact location of this facility.

All structures at the former screening plant have been demolished, and contaminated soils have been removed and placed in the mine. Restoration of the former screening plant is expected to be completed in 2003. Similarly, all removal actions were completed during 2002 at the former export plant site, and approximately 5,000 cubic yards of contaminated soils have been removed and placed in the mine. Removal activities have not been initiated at the mine or railroad loading station.

In 1963, the W.R. Grace Company (Grace) purchased Zonolite and continued vermiculite-mining operations in a similar fashion. In 1975, a wet milling process was added that operated in tandem with the dry mill until the dry mill was taken off line in 1985. The wet milling process was added to reduce dust generation of the milling process. Expansion operations at the former export plant ceased in Libby sometime prior to 1981 although this area was still used to bag and export milled ore until mining operations were stopped in 1990. Before the mine closed in 1990, Libby produced about 80 percent of the world's supply of vermiculite.

Since 1999, EPA Region VIII's Emergency Response Branch (ERB) has been conducting sampling and cleanup activities to address highly contaminated areas in the Libby Valley. The ERB investigation was initiated in response to media articles, which detailed extensive asbestos-related health problems in the Libby population. While at first the situation was thought limited to those with direct or indirect occupational exposures, it soon became clear that there were multiple exposure pathways and many persons with no link to mining-related activities were affected.

Typically, the amphibole asbestos contamination found in the Libby Valley comes from one or some combination of "primary" sources: vermiculite mining wastes, vermiculite ores, vermiculite processing wastes, bulk residuals from vermiculite processing, "LA-containing rocks," or Libby vermiculite attic insulation. Asbestos from these primary sources has been found in interior building dust samples and local soils, which in turn act as secondary sources. To date, the goal of ERB has been to find and identify areas with elevated levels of asbestos (the primary sources) and to remove them. ERB has conducted contaminated soil removals at the former export plant location, the former screening plant and adjacent properties, and several residential properties with asbestos source materials present. Three schools in the Libby school system have also had removals performed. Details of these operations can be found in the applicable Action Memorandums.

Future work in Libby is proceeding on two fronts. First, the removal of previously identified primary outdoor source areas continues and the removal of VCI from buildings in the Libby Valley will continue in 2003. Second, the EPA Superfund Remedial Program initiated an RI in 2002, of which the CSS is the first phase. The CSS will identify additional properties containing primary sources, which require immediate cleanup, as well as identify properties that might require further

investigation and/or remediation as final risk assessment and cleanup decisions are made.

For long-term management purposes, the Libby Asbestos Site has been divided into two OUs: Operable Unit 3 (OU3), which represents the former mine and Rainy Creek Road, and Operable Unit 4 (OU4), which represents the remainder of the Libby Valley. This FSP has been prepared to address investigative activities associated with OU4 only. Plans for the work associated with OU3 are expected in the near future.

2.3 Environmental Setting

Mean annual precipitation in Libby is 19.4 inches (in.), with 37 percent occurring between the months of November through January. In addition, 18 percent of the annual precipitation occurs during the months of May and June. The month having the highest average precipitation is January, with 2.42 in. Average ambient temperature in Libby ranges from 22.4°F in January to 67°F in July. Average annual precipitation at the mine site is estimated at 20 in. per year, and the temperature would be expected to average 3 to 5 degrees cooler due to the higher elevation relative to the City of Libby. Climatological data were obtained from the Libby 1 N.E. Ranger Station 5 miles northeast of Libby.

2.4 Contaminant of Concern

The contaminant of concern for this investigation is LA. Asbestos fibers are odorless and tasteless and vary in length, structure, and chemical composition. Fibers are microscopic and environmentally persistent. They do not evaporate, burn or dry out from heat, or erode in water. The toxicity of different types of asbestos fibers varies, but chronic and acute exposure to any one of them potentially can be fatal. While some chrysotile asbestos is likely present in the study area, it is not due to site-related contamination and is not considered a contaminant of concern. The CSS will not screen for chrysotile or other forms of asbestos, only LA. If other contaminants are discovered, the property owner will be properly advised.

The human health risks associated with asbestos fibers released in the environment include:

- Malignant mesothelioma, a cancer of the pleural or peritoneal cavity. In early stages of the disease, cancer is found in the lining of the chest cavity near the lung and heart or in the diaphragm. Mesothelioma may spread to tissue surrounding the lungs or other organs. Virtually all mesothelioma cases are attributable to asbestos exposure.
- Asbestosis, the scarring of the tissue of the lung itself from inhalation of fibers. It ranges in severity from mild impairment to disabling and eventually fatal.
- Lung cancer, any type of malignant tumor that originates in the lung itself. The exact relationship between asbestos exposure and lung cancer is not completely understood.

Figure 2-1

Figure 2-2

Figure 2-3

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Section 3

Data Quality Objectives

The DQO process is a series of seven planning steps based on the scientific method that are designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. The goal of the DQO process is to help assure that data of sufficient quality are obtained to support remedial response decisions, reduce overall costs of data sampling and analysis activities, and accelerate project planning and implementation. The DQO process related to this CSS is presented below and includes all information as required under the seven-step process.

A vermiculite ore body was discovered 7 miles northeast of Libby, Montana. Mining of this ore body began in the early 1920s and continued until 1990. This ore body contained amphibole asbestos fibers with compositions, including tremolite, actinolite, richterite, and winchite as defined by B.E. Leake, et al. (1997) (LA). Vermiculite in processed and unprocessed forms was used throughout the City of Libby as soil amendments, fill material, insulation, and as building materials. Occupational exposure to these asbestiform minerals occurred during the mining, processing, and transportation of the ore. Non-occupational exposures occurred as family members of workers were exposed through "worker take-home" ambient air levels, and from the presence of Libby vermiculite used as soil amendments, fill material, insulation, and in other building materials. Exposure to these asbestos fibers can cause several adverse health effects, including malignant mesothelioma, asbestosis, and lung cancer (ATSDR 2001). The exposure pathways are presented in the site conceptual model (Figure 3-1). Inhalation is the only exposure route of concern for this investigation.

In 1999, EPA was alerted by a newspaper article of an abnormally high incidence of asbestos-related disease in Libby, Montana and, therefore, began an investigation an emergency response in the area (Libby Asbestos Site). To date, EPA has identified sources of LA that present an immediate danger to human health (i.e., hot spots) and have begun removal actions of these sources (EPA 2000d, EPA 2001c). However, at present, EPA does not know locations of other sources of LA at residences and commercial sites that have not been investigated. Because LA-containing vermiculite products have been used randomly at unknown properties in the past, EPA has determined that each property in the study area requires screening for potential sources of LA. A sampling program, which exhaustively measures all potential LA sources and exposures at each property in one step (e.g. extensive indoor dust sampling, transmission electron microscopy [TEM] analysis, and risk-based outdoor sampling), is both unnecessary and cost/time prohibitive. A two-step sampling program, which builds upon past EPA investigations in Libby in order to limit future analytical costs while still making sound decisions, is a more efficient approach. In this regard, the CSS was designed as the first phase of the RI. The CSS is intended to screen all properties in the study area and generally classify them as either:

1. LA is present and it is likely that no further investigation will be necessary to determine that property requires cleanup.
2. LA is or may be present, but additional sampling and investigation is required to determine if cleanup is warranted. The 2nd phase of the RI would address these properties. The 2nd phase of the RI activities are detailed in the RI SAP (CDM 2003b).
3. There is no evidence that LA is present and it is likely that no cleanup or further investigation will be required.

Within that prioritization approach, the primary objective of the CSS is to determine the presence or absence of potential LA sources at each property in the study area. For purposes of this work, potential LA sources are classified into two categories:

- Primary sources, which include VCI, other visibly identifiable vermiculite products originating from the Libby mine (stockpiles of vermiculite, LA-containing rocks, etc.), and outdoor soils without visible vermiculite that contain greater than or equal to 1 percent LA by weight. The rationale for a 1 percent action level is discussed below.
- Secondary sources, which include contaminated indoor dust and outdoor soils without visible vermiculite that contains less than 1 percent LA by weight. Some indicators for the presence of secondary indoor sources (LA-contaminated dust) are the past presence of VCI, former or current occupants were persons employed at the mine or a former processing facility, and/or former or current occupants were diagnosed with an asbestos-related disease.

In addition, the information collected during this study will be used for the following:

- Quantification of relative LA abundance in soils
- Identification of characteristics of properties that may increase chances of exposure to LA
- Identification of characteristics of properties that may aid in the development of remedial decisions
- Determination of spatial trends
- Determination of future risk-based investigation and remedial decisions on a property by property basis

The planning team for the CSS includes Jim Christiansen (EPA RPM and decision maker), Mary Goldade (EPA project chemist), John McGuiggin (Volpe project manager), Tim Wall (CDM project manager for the Volpe), Jeff Montero (CDM RAC

project manager for EPA), David Schroeder (CDM onsite manager), Dee Warren (CDM CSS field team leader), and Krista Lippoldt (CDM QAC).

The information gathered to answer the primary objective will be collected from residential and commercial properties within the study area (target population). The spatial boundaries of these properties include everything between the top of the tallest structure to 6 inches below the ground surface and within each property boundary. The temporal boundaries include the time frame from when mining activities began at the mine site through the time of visual inspection and/or sampling at a property.

The information for this study was initially collected between May 13, 2002 and November 12, 2002 and will continue to be collected during 2003 field activities between May 19 and October 31, 2003. All personnel conducting the fieldwork associated with this CSS will be from CDM. Budget and schedules related to the project are discussed in the work plan (CDM 2003c).

In addition, the RI procedures detailed in the RI SAP (CDM 2003d) will be used concurrently at properties where CSS activities are conducted during 2003. Figure 3-2 illustrates how the RI sampling will be implemented concurrently with CSS activities conducted during the 2003 field season.

In order to meet the primary objective, a screening program using visual inspection, verbal interviews, and analytical results will be implemented. The following explains how each of these will be used.

- Visual inspection will be used to determine the presence or absence of VCI, primary outdoor sources (other than soil), and/or vermiculite present in building materials. If during visual inspection any of these sources is observed in any amount, they will be assumed to be present at the property. The rationale for considering visible observations of Libby vermiculite products or waste as a definitive indicator of LA content is presented in Appendix A.
- Verbal interviews will be used to identify properties that used Libby vermiculite attic insulation in the past, used vermiculite in building materials, had former or current occupants who were employed in vermiculite mining activities in Libby, and/or had former or current occupants who were diagnosed with an asbestos-related disease. If during a verbal interview, any of these factors is identified, the potential of an LA secondary source will be assumed.
- Analytical results of dust and soil samples will be used to determine if sources of LA are present and if cleanup is required. The determination of cleanup actions based on soil and dust results is explained in the Response Action Work Plan (RAWP) (CDM 2003e) and summarized in Table 3-1.

A range of asbestos analytical techniques are currently being considered for this investigation to identify potential LA in soil. Methods are currently being evaluated through a performance evaluation study conducted by EPA. Once the study is complete and the results reviewed, a determination will be made regarding the appropriate analytical method for soil.

The level to determine the presence or absence of LA in soil is assumed to be the reporting limit of the analytical method chosen. Again, because evaluation of soil analytical methods continues, this lower level cannot be exactly defined. At present, EPA has determined that soils exhibiting concentrations greater than or equal to 1% LA require cleanup. The rationale for choosing this concentration is presented below:

- Studies performed during the Phase 2 investigation demonstrate that disturbance of Libby vermiculite products or waste with any level of detectable asbestos (i.e. trace or higher) can release respirable asbestos fibers into the air, which may greatly exceed typical risk guidelines (EPA 2001a). Such releases have been documented even for materials for which bulk measurements of asbestos were non-detect by polarized light microscopy (PLM).
- Because of the potential that these materials may serve as sources for LA, EPA has determined that these materials should be cleaned up (EPA 2000d, EPA 2001c). In this regard, any detection of asbestos in bulk Libby vermiculite materials by PLM (i.e. trace) has been considered sufficient justification for action in Libby to this point.
- The concentration of asbestos in bulk materials that is detectable, but not quantifiable by PLM, (i.e., trace) is estimated to be approximately 0.5 percent by weight (i.e., one half PLM quantitation limit).
- Therefore, to remain strictly consistent with previous EPA actions regarding Libby vermiculite products or waste, concentrations of 0.5 percent or greater in soil could be considered the approximate trigger for action for the CSS and a valid cutoff between a primary and secondary source.
- However, because of the uncertainty of analytical results in this range, at the present time only soil with asbestos concentrations greater than 1 percent will spur immediate cleanup decisions (to ensure cleanup decisions are made on a "worst first" basis and to avoid making needless expenditures). Soils with concentrations less than 1 percent may be investigated further in the future.

EPA anticipates achieving reporting limits of approximately 0.1 to 0.2%. The action level to differentiate between a primary and secondary source in soil without visible vermiculite present is 1 percent by weight.

Visible vermiculite in specific use areas (current or former flowerbeds, current or former gardens, planters, and stockpiles of vermiculite) will be remediated per the

RAWP. Additional sampling will be required in other areas where visible vermiculite was noted (e.g., yard). This decision is based on two primary factors:

1. The amount of vermiculite in specific use area tends to be higher than in the yard, as it was often used in these areas as a soil conditioner. Such areas are most likely to contain elevated levels of LA. Generally, these areas are small, present the greatest exposure risk (people working in gardens), and can be remediated quickly. EPA has made the decision that cleaning up these areas without additional sampling will be most protective in the short term and most efficient over the long term.
2. The amount of vermiculite in the yard tended to be lower than in specific use areas (in fact it may have been a few flakes over a very large area). The yard generally presents a lesser exposure risk than specific use areas and is much larger and more difficult to remediate. EPA decided that additional sampling is required for these areas to determine if LA is present and cleanup is warranted.

Dust samples will be prepared for analytical analysis using ASTM Method D5755-95 and analyzed by the Asbestos Hazard Emergency Response Act (AHERA) TEM method. The level to determine the presence or absence of LA in dust is the reporting limit of the method. The reporting limit is dependent on air volume passed through the filter during sampling, flow rate during sample collection, and sample loading. A typical reporting limit for dust is 1,000 S/cm². Any detection of LA, at any level, will be considered to indicate the presence of LA. At present, EPA has selected a dust loading level of 5,000 LA S/cm² as a cutoff to determine if interior dust cleaning by EPA is required.

For the purposes of the RI, the detection of LA at any amount is considered to verify the presence of LA. However, during the emergency response cleanup program, cleanup will only be required when certain trigger levels are exceeded (e.g. 5,000 S/cm² in dust or 1% LA in soil). These levels are generally well above the anticipated detection limits of dust and soil analytical methods. Although it is known that some analytical error exists, no gray area was established around the emergency response trigger levels.

The practical constraints that may interfere with the collection of accurate and complete information include, but are not limited to lack of property access, misinformation from property owner/resident, unnoticed or hidden potential LA sources, inclement weather conditions (i.e., snow-covered ground, frozen soils, overcast skies, etc.), and lack of access to attics or wall cavities. Overcast skies reduce the visibility of phyllosilicates (unexpanded vermiculite); snow prevents outdoor visual confirmation; and frozen soils limit composite soil sample homogenization.

Depending on the type (primary or secondary) of potential LA sources, different alternative actions may be applicable. The alternative actions that may occur at a property as a result of information gathered during the study include the following:

- Remediation of interior, which includes removal of Libby vermiculite attic insulation and cleaning
- Remediation of exterior, which includes removal of primary sources
- Further indoor sampling
- Further outdoor sampling
- No further action at this time

The determination of which decision(s) is appropriate will be made following Table 3-1. These decisions are based on the following rationale:

- Primary sources (i.e., include Libby vermiculite attic insulation and outdoor source materials that are greater than or equal to 1 percent LA by weight) inherently contain high levels of LA (Appendix A).
- The levels of LA in primary sources pose a risk to human health (EPA 2001a).
- The presence of primary sources also indicates that secondary sources (i.e., contaminated indoor dust and outdoor soil source materials that are less than 1 percent LA by weight) may be present.
- Further risk-based investigation is needed to determine if secondary sources pose a risk to human health.
- It is necessary to identify secondary sources at each property in the instance that further risk-based investigation indicates that these sources pose a risk to human health. If it is determined that secondary sources do pose a risk, further action (i.e., remediation) may be taken at properties with secondary sources.
- Properties that do not meet any of these triggers for action will not undergo any remediation at this time. But, these properties might require further investigation and/or remediation as final risk assessment and cleanup decisions are made.

DQOs were reviewed and used to design the study/sampling process detailed in this SAP (Sections 4 and 5).

Figure 3-1

Figure 3-2

